

# High-Efficiency, High-Temperature, Ultra-Lightweight GaP-Based Solar Cells, Phase II

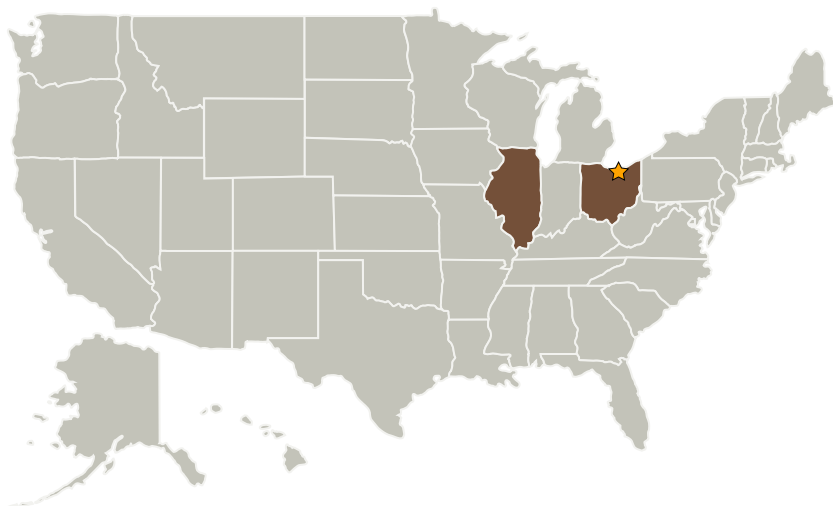
Completed Technology Project (2007 - 2009)



## Project Introduction

The objective of this proposal is to study and demonstrate novel GaAsNP/GaP/AlGaP technology for use in extreme photovoltaic (PV) energy conversion. NASA and the scientific community are interested in solar missions that go as far as Saturn or even into near sun conditions. Such missions present a challenging problem for PV technology. In addition to the requisite high efficiency and reduced solar cell payload mass, these missions require a PV technology that can withstand the increased solar intensity, radiation and temperature. We propose studying two possible solar cell designs: The first design utilizes novel, wide gap GaP-based materials to provide bandgaps well suited for high-temperature operation and to enhance function in high radiation and near sun missions. Such an approach will enable solar cells to operate at and above 450 Celcius with the highest possible efficiency. As part of this study we would investigate the deposition of AlGaP on GaP to provide materials with bandgaps at or above 2.4 eV. The second design we will investigate uses more standard materials that EpiWorks has already developed for different applications. This design would employ InAlP (2.4eV bandgap) lattice-matched to GaAs as the key wide gap material. We will study the expected temperature dependence and other key thermal properties of such a design and compare to the GaP-based approach.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Glenn Research Center (GRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
EpiWorks, Inc.	Supporting Organization	Industry	Champaign, Illinois

Primary U.S. Work Locations	
Illinois	Ohio

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.1 Power Generation and Energy Conversion
    - └ TX03.1.1 Photovoltaic